IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	**MAIL STOP PETITIONS**
NATHAN S. LEWIS et al.	Group Art Unit: 1777
Application No.: 09/409,644	Examiner: SODERQUIST, ARLEN
Filed: October 1, 1999	Confirmation No.: 5684
For: CONDUCTIVE ORGANIC SENSORS, ARRAYS AND METHODS OF USE	Certificate of Electronic Deposit I hereby certify that this correspondence is being deposited with the United States Patent & Trademark Office on May 8, 2012 via EFS-Web. By: /Joseph R. Baker, Jr./ Joseph R. Baker, Jr.

§1.181 PETITION FOR PATENT TERM ADJUSTMENT UNDER 37 C.F.R. 1.701

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Patentee hereby requests reconsideration of the Patent Term Adjustment (PTA) accorded to the above referenced patent.

Reconsideration of the final PTA calculation to increase total PTA from 0 to 1767 days is respectfully requested.

REMARKS

Legal Authority: Under 37 CFR §1.701, *Extension of patent term due to examination delay under the Uruguay Round Agreements Act,* subsection (a), a patentee is entitled to an extension of the patent term for a patent issued on an application filed on or after June 8, 1995, if the issuance of the patent was delayed due to:

> "…and/or (3) Appellate review by the Board of Patent Appeals and Interferences or by a Federal court under 35 U.S.C. 141 or 145, if the patent was issued pursuant to a decision in the review reversing an adverse determination of patentability and if the patent is not subject to a terminal disclaimer due to the issuance of another patent claiming subject matter that is not patentably distinct from that under appellate review. If an application is remanded by a panel of the Board of Patent Appeals and

> Interferences and the remand is the last action by a panel of the Board of Patent Appeals and Interferences prior to the mailing of a notice of allowance under 35 U.S.C. 151 in the application, the remand shall be considered a decision in the review reversing an adverse determination of patentability as that phrase is used in 35 U.S.C. 154(b)(2) as amended by section 532(a) of the Uruguay Round Agreements Act, Public Law 103-465, 108 Stat. 4809, 4983-85 (1994), and a final decision in favor of the applicant under paragraph (c)(3) of this section. A remand by a panel of the Board of Patent Appeals and Interferences shall not be considered a decision in the review reversing an adverse determination of patentability as provided in this paragraph if there is filed a request for continued examination under 35 U.S.C. 132(b) that was not first preceded by the mailing, after such remand, of at least one of an action under 35 U.S.C. 132 or a notice of allowance under 35 U.S.C. 151."

Requested Relief: Applicant requests that PTA for the instant application be adjusted for the period of delay under 37 CFR §1.701(a) (3), for the sum of the number of days (1767 days), in the period beginning on April 25, 2005, the date the appeal to BPAI was filed under 35 *U.S.C.* 134 and ending on the date of the final decision by the BPAI reversing an adverse determination of patentability on February 24, 2010.

Statement of Facts: Patentee filed a notice of appeal to BPAI on April 25, 2005 under 35 *U.S.C.* 134. (See Exhibit A, Patent Term Extension History for U.S. application no 09/409,644, at page 3). The decision by BPAI was made on February 24, 2010 (see Exhibit A, at page 2). BPAI reversed an adverse determination of patentability made by the Examiner by ordering the following:

> "We REVERSE the Examiner's rejeciton of claims 98-110, 112, 113, 115, 117-123, 126-135, 137, 139-157, and 159 under 35 U.S.C § 103(a) in view of the combined teachings of Gibson, Barisci, and any of Casella, Li, Thackeray, Yamato, Wampler, Naarmann, or Sakaguchi."
>
> We REVERSE the Examiner's rejection of claims 114, 116, 136, 138 and 158 stand rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Gibson, Barisci, and any of Casella, Li, Thackeray, Yamato, Wampler, Naarmann, or Sakaguchi, and any of Breheret, Mifsud, Moy or Persaud." (See Exhibit B, "*Ex parte* NATHAN S. LEWIS, CAROL LEWIS, ROBERT GRUBBS, and GREGORY ALLEN SOTZING, Appeal No. 2009-10154," at page 33).

A notice of allowance was mailed on February 9, 2012 (See Exhibit A, at page 2). During the period from the BPAI decision of February 24, 2010 and the notice allowance mailed on February 9, 2012 there were no additional BPAI decisions (see Exhibit A).

During the entire pendency of the application, Patentee made no Requests for Continued Examination under 35 *U.S.C.* 132(b) (see Exhibit A).

Applicant Delay: During the period of appellate review, Patentee exhibited a reasonable degree of timeliness as may reasonably be expected from, and which is ordinarily exercised by, a person during a period of appellate review.

Terminal Disclaimer: The patent application is not subject to a terminal disclaimer.

Conclusion: In consideration of the events presented above, Patentee believes the PTA calculation of 0 days is incorrect. As such, Patentee respectfully requests reconsideration of the PTA in the following manner:

(1) There is a total of 1767 days (including 2/24/2010) between the notice of appeal filed April 25, 2005 and decision made by BPAI on February 24, 2010 reversing the adverse determination of patentability made by the Examiner; and

(2) The period of delay should not be reduced under 37 CFR §1.701(d), as Patentee believes the Director will determine that Patentee exhibited no unreasonable delays during the period of appellate review, and that the Notice of Appeal was made more than three years after the patent application was filed.

(3) Accordingly, the total PTA should be calculated as 1767 days.

Please apply the fee of $200.00 as required under 37 C.F.R. § 1.18(e) and any other required charges or credits to Deposit Account No. 50-4586, referencing Attorney Docket Number 00016-02201/CIT2883.

Respectfully submitted,

GAVRILOVICH, DODD & LINDSEY LLP

Date: May 8, 2012

By: /Joseph R. Baker, Jr./

Joseph R. Baker, Jr.
Registration No. 40900

4660 La Jolla Village Drive, Suite 750
San Diego, California 92122
(858) 458-3607 (Main)
(858) 458-9986 (Fax)

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09/409,644 **CONDUCTIVE ORGANIC SENSORS, ARRAYS AND METHODS OF USE** **00016-022001/CIT 2883**

Select New Case | Applications by Attorney Docket | Application Data | Transaction History | Image File Wrapper | Patent Term Extension History | Continuity Data | Fees | Address & Attorney/Agent | Assignments | Display References | Publication Review

Patent Term Extension

Filing or 371(c) Date:	10-01-1999	USPTO Delay (PTO) Delay (days):	0
USPTO Adjustment (days):	+0	Corrections (APPL) Delay (days):	0
Explanation Of Calculations		Total Patent Term Extension (days):	0

Patent Term Extension History

Date	Contents Description	PTO(Days)	APPL(Days)
02-09-2012	Mail Notice of Allowance		
02-09-2012	Document Verification		
02-09-2012	Notice of Allowance Data Verification Completed		
02-06-2012	Reasons for Allowance		
01-27-2012	Mail Applicant Initiated Interview Summary		
01-26-2012	Interview Summary- Applicant Initiated		
10-18-2011	Mail Examiner Interview Summary (PTOL - 413)		
10-12-2011	Interview Summary- Applicant Initiated		
10-12-2011	Examiner Interview Summary Record (PTOL - 413)		
07-26-2011	Mail Advisory Action (PTOL - 303)		
07-25-2011	Advisory Action (PTOL-303)		
07-20-2011	Date Forwarded to Examiner		
07-12-2011	Amendment/Argument after Notice of Appeal		
07-12-2011	Notice of Appeal Filed		
07-12-2011	Request for Extension of Time - Granted		
01-12-2011	Mail Final Rejection (PTOL - 326)		
01-12-2011	Final Rejection		
11-30-2010	Date Forwarded to Examiner		
11-26-2010	Response after Non-Final Action		
11-26-2010	Request for Extension of Time - Granted		
10-06-2010	Case Docketed to Examiner in GAU		
05-26-2010	Mail Non-Final Rejection		
05-24-2010	Non-Final Rejection		
03-28-2005	Information Disclosure Statement considered		
04-23-2010	Amendment/Argument after BPAI Decision		
02-24-2010	Mail BPAI Decision on Appeal - Affirmed		
02-24-2010	BPAI Decision - Examiner Affirmed		
02-24-2010	Mail - BPAI Decision 41.50(b) In IFW: 196(b)		
01-20-2010	Mail BOA miscellaneous communication to applicant		
01-20-2010	BOA miscellaneous communication to applicant		
11-17-2009	Confirmation of Hearing by Appellant		
10-26-2009	Notification of Appeal Hearing		
10-26-2009	Notification of Appeal Hearing		
08-26-2009	Change in Power of Attorney (May Include Associate POA)		
08-20-2009	Correspondence Address Change		
07-07-2009	Email Notification		
07-07-2009	Mail BOA miscellaneous communication to applicant		
07-02-2009	BOA miscellaneous communication to applicant		
05-28-2009	Docketing Notice Mailed to Appellant		
05-26-2009	Assignment of Appeal Number		
05-19-2009	Appeal Awaiting BPAI Docketing		
01-04-2009	Appeal ready for BPAI review		
10-03-2008	Electronic Review		
10-03-2008	Email Notification		
10-03-2008	Mail Supplemental Examiner's Answer		
09-29-2008	2nd or Subsequent Examiner's Answer to Appeal Brief		
09-29-2008	Case Docketed to Examiner in GAU		
03-28-2005	Information Disclosure Statement (IDS) Filed		
08-03-2008	Email Notification		
08-03-2008	Email Notification		
07-30-2008	Order Returning Undocketed Appeal to the Examiner		
07-30-2008	Order Returning Undocketed Appeal to the Examiner		
03-19-2008	Appeal Awaiting BPAI Docketing		
12-06-2007	Email Notification		
12-06-2007	Mail Reply Brief Noted by Examiner		
12-03-2007	Reply Brief Noted by Examiner		
11-06-2007	Date Forwarded to Examiner		
10-22-2007	Reply Brief Filed		
10-22-2007	Appeal ready for BPAI docketing		
10-04-2007	Electronic Review		
10-03-2007	Email Notification		
10-03-2007	Mail Miscellaneous Communication to Applicant		
09-27-2007	Miscellaneous Communication to Applicant - No Action Count		
09-18-2007	Return of Undocketed appeal to the TC		
09-18-2007	Exam. Ans. Review Complete		
08-22-2007	Mail Supplemental Examiner's Answer		
08-20-2007	2nd or Subsequent Examiner's Answer to Appeal Brief		
06-18-2007	Date Forwarded to Examiner		
05-10-2007	Reply Brief Filed		

05-15-2007	Exam. Ans. Review Complete
03-19-2007	Mail Supplemental Examiner's Answer
03-16-2007	2nd or Subsequent Examiner's Answer to Appeal Brief
01-09-2007	Mail Miscellaneous Communication to Applicant
01-08-2007	Appeal Brief Review Complete
01-08-2007	Date Forwarded to Examiner
11-13-2006	Resp. to post-examiner ans
12-12-2006	Miscellaneous Communication to Applicant - No Action Count
11-08-2006	Mail Post-examiner ans. com
11-06-2006	Post-examiner ans. com
10-25-2006	Order Returning Undocketed Appeal to the Examiner
09-28-2006	Appeal Awaiting BPAI Docketing
12-29-2005	Receipt of all Acknowledgement Letters
12-29-2005	Receipt of Acknowledgment Letter
12-09-2005	Mail Supplemental Examiner's Answer
12-07-2005	2nd or Subsequent Examiner's Answer to Appeal Brief
09-28-2005	Date Forwarded to Examiner
09-22-2005	Reply Brief Filed
07-22-2005	Mail Examiner's Answer
07-14-2005	Examiner's Answer to Appeal Brief
05-04-2005	Date Forwarded to Examiner
04-25-2005	Appeal Brief Filed
04-25-2005	Notice of Appeal Filed
04-22-2005	Information Disclosure Statement (IDS) Filed
04-22-2005	Information Disclosure Statement (IDS) Filed
03-28-2005	Reference capture on IDS
03-28-2005	Information Disclosure Statement (IDS) Filed
04-07-2005	Correspondence Address Change
04-07-2005	Change in Power of Attorney (May Include Associate POA)
01-25-2005	Mail Non-Final Rejection
01-24-2005	Non-Final Rejection
11-19-2004	Date Forwarded to Examiner
11-09-2004	Appeal Brief Filed
11-09-2004	Request for Extension of Time - Granted
08-23-2004	Notice of Appeal Filed
08-23-2004	Request for Extension of Time - Granted
08-03-2004	Mail Advisory Action (PTOL - 303)
08-02-2004	Advisory Action (PTOL-303)
07-26-2004	Date Forwarded to Examiner
07-15-2004	Amendment after Final Rejection
04-20-2004	Mail Final Rejection (PTOL - 326)
04-19-2004	Final Rejection
02-09-2004	IFW Amended case processing Complete
02-09-2004	Date Forwarded to Examiner
01-26-2004	Response after Non-Final Action
01-26-2004	Request for Extension of Time - Granted
09-29-2003	Mail Non-Final Rejection
09-26-2003	Non-Final Rejection
09-15-2003	Date Forwarded to Examiner
09-08-2003	Amendment after Final Rejection
09-08-2003	Request for Extension of Time - Granted
08-22-2003	Examiner Interview Summary Record (PTOL - 413)
05-07-2003	Mail Final Rejection (PTOL - 326)
05-05-2003	Final Rejection
03-04-2003	Affidavit(s) (Rule 131 or 132) or Exhibit(s) Received
03-14-2003	Date Forwarded to Examiner
03-04-2003	Response after Non-Final Action
03-04-2003	Request for Extension of Time - Granted
12-02-2002	Information Disclosure Statement (IDS) Filed
12-02-2002	Information Disclosure Statement (IDS) Filed
10-23-2002	Mail Non-Final Rejection
10-21-2002	Non-Final Rejection
10-04-2002	Date Forwarded to Examiner
10-01-2002	Amendment after Final Rejection
10-01-2002	Request for Extension of Time - Granted
09-20-2002	Correspondence Address Change
09-23-2002	Change in Power of Attorney (May Include Associate POA)
09-11-2002	Examiner Interview Summary Record (PTOL - 413)
05-22-2002	Mail Final Rejection (PTOL - 326)
05-20-2002	Final Rejection

03-28-2002	Correspondence Address Change
03-04-2002	Information Disclosure Statement (IDS) Filed
03-04-2002	Information Disclosure Statement (IDS) Filed
03-28-2002	Date Forwarded to Examiner
03-04-2002	Response after Non-Final Action
03-04-2002	Request for Extension of Time - Granted
11-09-2001	Referred by L&R for Third-Level Security Review. Agency Referral Letter Generated
09-21-2001	Mail Non-Final Rejection
09-19-2001	Non-Final Rejection
09-13-2001	Case Docketed to Examiner in GAU
08-30-2001	Date Forwarded to Examiner
08-22-2001	Response to Election / Restriction Filed
08-22-2001	Request for Extension of Time - Granted
06-20-2001	Mail Restriction Requirement
06-19-2001	Restriction/Election Requirement
10-26-2000	Preliminary Amendment
09-11-2000	Information Disclosure Statement (IDS) Filed
09-11-2000	Information Disclosure Statement (IDS) Filed
03-22-2000	Information Disclosure Statement (IDS) Filed
03-22-2000	Information Disclosure Statement (IDS) Filed
12-09-1999	Information Disclosure Statement (IDS) Filed
12-09-1999	Information Disclosure Statement (IDS) Filed
06-30-2000	Case Docketed to Examiner in GAU
06-09-2000	Transfer Inquiry
03-21-2000	Application Dispatched from OIPE
03-21-2000	Application Is Now Complete
10-27-1999	Notice Mailed--Application Incomplete--Filing Date Assigned
10-20-1999	IFW Scan & PACR Auto Security Review
10-26-1999	Preexamination Location Change
10-08-1999	Initial Exam Team nn

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/409,644	10/01/1999	NATHAN S. LEWIS	00016-022001/CIT 2883	5684

26138 7590 02/24/2010
Joseph R. Baker, APC
Gavrilovich, Dodd & Lindsey LLP
4660 La Jolla Village Drive, Suite 750
San Diego, CA 92122

EXAMINER	
SODERQUIST, ARLEN	
ART UNIT	PAPER NUMBER
1797	

MAIL DATE	DELIVERY MODE
02/24/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte NATHAN S. LEWIS,
CAROL LEWIS, ROBERT GRUBBS, and
GREGORY ALLEN SOTZING

Appeal 2009-10154
Application 09/409,644
Technology Center 1700

Heard: 10 December 2009
Decided: February 24, 2010

Before EDWARD C. KIMLIN, CHARLES F. WARREN, and
MARK NAGUMO, *Administrative Patent Judges.*

NAGUMO, *Administrative Patent Judge.*

DECISION ON APPEAL

A. Introduction[1,2]

Nathan S. Lewis, Carol Lewis, Robert Grubbs, and Gregory Allen Sotzing ("Lewis") timely appeal under 35 U.S.C. § 134(a) from the final rejection[3] of claims 98-110, 112-123, and 126-159.[4] We have jurisdiction under 35 U.S.C. § 6. We AFFIRM, but denominate our reasoning as a new ground of rejection.

The subject matter on appeal relates to chemical sensors said to be particularly useful as "analogs of the mammalian olfactory system" (Spec. 1, l. 22), or, colloquially, as an "electronic nose" (*id.* at 6, l. 21). Prior art sensors are said to need dramatically improved detection sensitivity, especially towards biogenic amines and thiols (*id.* at 4, ll. 8-12), in order to mimic the human nose for such uses as monitoring food freshness or identifying disease states (*id.* at 5, ll. 2-7).

The 644 Specification describes sensors based on a variety of "chemiresistor elements" that are said to "yield a rapid, low-power,

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[1] Application 09/409,644, *Conductive Organic Sensors, Arrays and Methods of Use*, filed 1 October 1999, claiming the benefit of provisional applications filed 2 October 1998 and 9 July 1999. The specification is referred to as the "644 Specification," and is cited as "Spec." The real parties in interest are listed as the California Institute of Technology, and Carol Lewis. (Supplemental Appeal Brief, filed 13 November 2006 ("Br."), 2.)

[2] The Official Transcript of the hearing held on 10 December 2009, is cited as "TR."

[3] Office action mailed 25 January 2005 (cited as "OA").

[4] Remaining pending claims 50-72 and 85-90 have been withdrawn from consideration and are not before us.

dc electrical signal in response to the analyte of interest." (Spec. 7, ll. 10-13.) The sensors are said to comprise, generally, "an electrically conductive organic material and a compositionally different conductive material" (*id.* at 12, ll. 14-15) disposed in different regions between two measuring electrodes (*id.* at 25, ll. 11-14).

According to the 644 Specification, as "the [sensor] material absorbs, adsorbs or imbibes an analyte" (Spec. 26, ll. 1-2), it is thought that "the dynamic aggregate resistance provided by these gaps in a given resistor [, e.g., between regions of the compositionally different conductive material,] is a function of analyte permeation of the conductive organic regions of the material" (*id.* at ll. 2-5). Thus, choice of the two distinct materials enables fine tuning of the response of a given sensor to particular analytes based on the degree to which an analyte enters the organic regions of the sensing element. The 644 Specification teaches that a "detector [is] operatively associated with the sensor, for measuring the response of the sensor." (*Id.* at 12, ll. 17-18.) In various embodiments, the detectors are said to be "optimized to detect a member selected from the group consisting of electromagnetic energy, optical properties, resistance, capacitance, inductance, impedance and combinations thereof." (*Id.* at 13, ll. 10-14.) Ultimately, in an "electronic nose," a large number of these sensors can be combined with each other and with other sensors in arrays to provide high degrees of resolution to distinguish various analytes. (*Id.* at 59, l. 21, to 60, l. 15.)

Representative Claim 98 is reproduced from the Claims Appendix to the Principal Brief on Appeal:

98. A sensor, comprising:

at least two conductive leads;

a sensing area comprising

alternating regions of

a conductive organic material and

a conductive material compositionally different than the conductive organic material

disposed between, and in contact with, the at least two conductive leads,

wherein the sensing area is in *direct contact* with a vapor comprising an analyte to be detected,

wherein the compositionally different conductive material is selected from the group consisting of an inorganic conductor, a carbon black, and a mixed inorganic/organic conductor,

wherein the inorganic conductor is a metal, a metal alloy, a metal oxide, a superconductor, or a combination thereof and

wherein the inorganic conductor has an electrical conductivity that decreases as the temperature increase[s]; and

an apparatus in electrical communication with the conductive leads for *detecting a change in the sensing area* between the at least two conductive leads when contacted with an analyte.

(Claims App., Br. 40; paragraphing, indentation, and emphasis added.)

Independent claims 104, 105, and 106 cover a sensor. Independent claims 108, 126, and 127 cover a sensor array. Independent claim 128 covers a "sensor array system," while independent claims 148 and 152 each cover a "system" of sensors. Claims 114 and 116, which depend from claim 108, and claims 136 and 138, which depend from claim 128, require temperature control of at least one sensor. Claim 158 depends from claim 152 and requires the presence of at least one of a list of distinct kinds of sensors in addition to a sensor similar to the sensor recited in claim 98. A table outlining the major limitations of the independent claims is presented at 22, *infra*.

The Examiner has maintained the following grounds of rejection:[5]

> A. Claims 98-110, 112, 113, 115, 117-123, 126-135, 137, 139-157, and 159 stand rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Gibson,[6] Barisci,[7] and any of Casella,[8] Li,[9] Thackeray,[10] Yamato,[11] Wampler,[12] Naarmann,[13] or Sakaguchi.[14]

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[5] Supplemental Examiner's Answer mailed 3 October 2008. ("Ans."). Rejections under 35 U.S.C. § 112(2), an obviousness double patenting rejection, and rejections based on the Stetter and on the DeLacy Costello references have been withdrawn. (Ans. 4.) The order of the alternative secondary references has been altered slightly to group them by related subject matter.

[6] Timothy David Gibson et al., *Odour Sensor*, WO 9607901A1 (1996).

[7] J.N. Barisci et al., *Conducting Polymer Sensors*, 4 TRIP 307 (1996).

[8] Innocenzo G. Casella et al., *Copper Dispersed into Polyaniline Films as an Amperometric Sensor in Alkaline Solutions of Amino Acids and Polyhydric Compounds*, 335 Anal. Chim. Acta 335 (1996).

[9] H. Li et al., 369 Mat. Res. Soc. Symp. Prov. VI 581 (1995).

> B. Claims 114, 116, 136, 138, and 158 stand rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Gibson, Barisci, and any of Casella, Li, Thackeray, Yamato, Wampler, Naarmann, or Sakaguchi, and any of Breheret,[15] Mifsud,[16] Moy,[17] or Persaud.[18]

We base our Decision on the rejection mailed 25 January 2005, the Brief filed 13 November 2006, the Examiner's Answer mailed 3 October 2007, and the Reply filed 22 October 2007.

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[10] James W. Thackeray and Mark S. Wrighton, *Chemically Responsive Microelectrochemical Devices Based on Platinized Poly(3-methylthiophene): Variation in Conductivity with Variation in Hydrogen, Oxygen, or pH in Aqueous solution*, 90 J. Phys. Chem. 6674 (1986).

[11] Hitoshi Yamato et al., 87 Synthetic Metals 231 (1997).

[12] Wesley A. Wampler et al., *Composites of Polypyrrole and Carbon Black: Part III. Chemical Synthesis and Characterization*, 10 J. Mater. Res. 1811 (1995).

[13] H. Naarmann et al., *Electrically Conductive Polymers from Polyheterocyclic Compounds with Derivatives of Tetrathiafulvalene as Counterions, Their Preparation and Their Use*, DE 37 28 452 (1989) (USPTO translation).

[14] M. Sakaguchi et al., JP 0402958 (1992).

[15] S. Breheret et al., 95 Bioflavour 103 (1995).

[16] Jean Christophe Mifsud and L. Moy, *Methods and Devices for the Detection of Odorous Substances and Applications*, U.S. Patent 5,801,297 (1998), used, without objection, as a translation of WO 95/08113 (1995), which is also relied on as a basis of rejection.

[17] L. Moy et al., 95 Bioflavour 55 (1995).

[18] Krishna Chandra Persaud and Paolo Pelosi, WO 86/01599 (1986).

Briefly, the Examiner relies on Gibson for descriptions of a gas sensor having the required structures and functions, including conducting polymers and blends of conducting polymers between the electrodes, but for the alternating regions of a compositionally different conductive material of the required type. The Examiner relies on the group of references cited in the alternative in Rejection A (hereinafter, "alternative secondary references") as evidence of particular instances of conductive polymers containing metal particles (Casella, Li, Thackeray, Yamato), carbon black (Wampler), organic anions (Naarmann), and organic metal complexes (Sakaguchi), all of which, the Examiner finds, are useful in sensors. According to the Examiner, motivation to combine the references is provided by Barisci, which reviews sensors based on conductive polymers. The Examiner finds that Barisci teaches that conductive polymers have been found to be useful in both conductimetric sensors and amperometric sensors due to the sensitivity of conductive polymers to the chemical environment in which they are placed.[19] The Examiner concludes that a person having ordinary skill in the art would have expected the advantages of the conductive polymer composites taught as sensing electrode materials by the polymer references to be obtained in when substituted for the conductive polymers described by Gibson.

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[19] Conductimetric sensors measure changes in the conductivity or, equivalently, the resistivity, of the conductive polymer upon exposure to an analyte. Amperometric sensors measure changes in the current in an electrochemical cell in which the conductive polymer forms part of the sensing electrode.

More particularly, the Examiner maintains that it would have been obvious to incorporate conductors such as carbon black, anions of tetrathiafulvalene, metal particles or metal oxide taught by the secondary references into the conductive organic polymers used in the sensing arrays of Gibson "*because of their sensitivity to known analyte gases or enhanced sensing and/or stability properties* as taught by each of [the references] *compared to sensors made with only the conductive polymers taught by Gibson*." (OA 15, ll. 1-8; emphasis added.) The Examiner maintains further that Barisci shows that persons having ordinary skill in the art would have recognized and expected "the Gibson conductive polymers to be affected by interactions in a number of sensing formats in a manner that changes the electronic structure and as a result the resistivity of the polymer as shown by Barisci." (*Id.* at ll. 8-11.)

Lewis contends the Examiner failed to establish a prima facie case of obviousness because the substitution of the electrode materials taught by the polymer references is not a substitution of materials functionally equivalent to the conductive polymeric electrode materials taught by Gibson. The electrode materials taught by the secondary references, Lewis argues, "serve different purposes and are selected based [on] different properties (i.e., the materials of amperometric sensors are selected, in part, because they do not change conductivity)." (Br., sentence bridging 7-8; *id.* at 13-16.) In contrast, Lewis urges, materials for conductimetric sensors, such as those taught by Gibson, are selected based on their ability to change conductivity in response to an analyte. (Br. 8; *id.* at 13-16.)

In response to Lewis's arguments, the Examiner argues further, quoting Barisci at 307 (Ans. 20), that "[i]t is clear that the electrical properties of these materials [conducting polymers] are sensitive to both the material composition and the environment in which they are placed." (*Id.* at 21, ll. 1-2.) The Examiner concludes that "one of ordinary skill in the art would have recognized commonality between the properties of the conductive polymers and the ability to measure a change in the properties of the conductive polymers by the two measurement techniques." (*Id.* at ll. 20-23.) The critical fact, in the Examiner's view, is that in both conductimetric and amperometric sensors, "the interaction with the environment causes change in the electrical properties." (*Id.* at ll. 24-25.) The Examiner emphasizes that "it is the replacement of the conducting polymer compositions of Gibson with those of the secondary references above that the examiner is urging to be obvious in view of the teaching of the applied art." (*Id.* at ll. 27-29.)

B. Findings of Fact

Findings of fact throughout this Opinion are supported by a preponderance of the evidence of record.

<u>The 644 Specification</u>

1. Most generally, the 644 Specification indicates it is directed towards "sensors having electrical properties that vary according to the presence and concentrations of analytes." (Spec. 1, ll. 15-17.)

2. More particularly, sensors that act "as analogs of the mammalian olfactory system" (Spec. 1, ll. 21-22) or, colloquially, as an "electronic nose" *id.* at 6, l. 22) are of interest.

3. An object of the invention is said to be "to provide a broadly responsive analyte detection sensor array based on a variety of 'chemiresistor' elements." (Spec. 7, ll. 8-10.)

4. Such sensors are said to be simply prepared and to "yield a rapid, low-power, dc electrical signal in response to the analyte of interest." (Spec. 7, ll. 10-13; see also *id.* at 12, ll. 12-17.)

5. A detector is "operatively associated with the sensor, for measuring the response of the sensor." (Spec. 12, ll. 17-18.)

6. According to the 644 Specification, "The detector or measuring device is optimized to detect a member selected from the group consisting of electromagnetic energy, optical properties, resistance, capacitance, inductance, impedance and combinations thereof." (Spec. 13, ll. 10-13.)

7. The 644 Specification teaches that "[a]t least one sensor in the array is composed of a material comprising regions of an organic electrical conductor with regions of a compositionally dissimilar material that is an electrical conductor." (Spec. 25, ll. 8-11.)

8. Conductors are said to "include, for example those having a positive temperature coefficient of resistance" (Spec. 27, l. 21 to 28, l. 1), i.e., the resistance increases (equivalently, the electrical conductance decreases) as the temperature increases (*id.* at 34, ll. 12-14).

9. In contrast, the 644 Specification characterizes semiconductors as "materials whose electrical conductivity increases as the temperature increases." (Spec. 34, ll. 10-12.)

10. More specifically, the 644 Specification teaches that

> the conducting region can be anything that can carry electrons from atom to atom, including, but not limited to, a material, a particle, a metal, a polymer, a substrate, an ion, an alloy, an organic material, (e.g., carbon, graphite, etc.) an inorganic material, a biomaterial, a solid, a liquid, a gas or regions thereof.

(Spec. 28, l. 16, to 29, l. 5.)

11. In the words of the 644 Specification, "[t]he resistor comprises a plurality of alternating regions of differing compositions and therefore differing conductivity transverse to the electrical path between the conductive leads." (Spec. 25, ll. 12-14.)

12. According to the 644 Specification, such sensors can be fabricated by blending the two conductive materials. (Spec. 25, ll. 14-16.)

13. More specifically, the chemiresistors are said to be fabricated by solution casting, when both conductors are soluble; by suspension casting, when one conductor is soluble and the other is not; and by mechanical mixing, e.g., by ball milling, when neither is soluble in a solvent. (Spec. 38, l. 5, to 41, l. 14.)

14. An example of a chemiresistor of the invention is said to comprise a "dispersion of particulate conductive material in a region of conductive organic material," in which "the regions separating the particles provide

changes in conductance relative to the conductance of the particles themselves." (Spec. 25, ll. 17-20.)

15. The 644 Specification teaches that "[t]he gaps of different conductance arising from the organic conductive material ranges in path length from about 10 to 1,000 angstroms, usually on the order of 100 angstroms." (Spec. 25, ll. 20-23.)

16. According to the 644 Specification, in such a material, "[t]he gaps of different conductance arising from the organic conductive material range in path length from about 10 to 1,000 angstroms, usually on the order of 100 angstroms." (Spec. 25, ll. 20-23.)

17. The 644 Specification teaches that "[t]he path length and resistance of a given gap is not constant but rather is believed to change as the material absorbs, adsorbs or imbibes an analyte."

18. "Accordingly," the 644 Specification explains, "the dynamic aggregate resistance provided by these gaps in a given resistor is a function of analyte permeation of the conductive organic regions of the material." (Spec. 26, ll. 2-5.)

19. Insulators, or non-conducting regions, can also be incorporated into the composite "to further manipulate the analyte response properties of the composites." (Spec. 36, ll. 2-3.)

20. In the words of the 644 Specification, "[p]referably, the signal is an electrical resistance, although it could also be an impedance or other physical property of the material in response to the presence of the analyte in the fluid." (Spec. 60, ll. 4-6.)

21. In an embodiment, acid-doped polyaniline (partially reduced polyaniline, "emeraldine," doped with dodecyl benzene sulfonic acid (DBSA) is dissolved in a solvent, sonicated with carbon black (Spec. 72-73, Example A) and cased onto a glass substrate having two gold leads (*id.* at 73-74, Example B).

22. The response of a sensor to "typical solvents" such as methanol, tetrahydrofuran, chloroform, and water (Spec. 76, ll. 22-23) is reported as 0.5 to 5% $\Delta R/R$ at 1% vapor pressure (*id.* at ll. 15-17).

23. In contrast, a sensor reportedly showed a response to butyl amine ranging from 9000% to 90000% $\Delta R/R$ at 0.5% vapor pressure. (Spec. 77, ll. 21-22; Figure 5.)

Gibson

24. Gibson describes an "odour" or "personnel recognition" sensor comprising "a multiplicity of differentially responding chemo-resistor elements." (Gibson 1, 3d para.)

25. The chemo-resistive elements comprise conductive polymer films, which are monitored for changes in the electronic characteristics, particularly the resistance, impedance, reactance, or capacitance, in response to exposure to gaseous sample. (Gibson 1, 2d para.)

26. Sensors are described as comprising a multiplicity of chemo-resistive elements comprising a plurality of electrodes disposed on a nonconductive substrate, the electrodes overlaid with one or more layers of conductive polymers, and to have different conductive polymers on at least two of the chemoresistive elements. (Gibson 1, paras. 3-6.)

27. Provisions are made to introduce a gaseous sample to the sensors, and for detectors responsive to the signals from the multiplicity of elements. (Gibson 1, paras. 7-8; 2, 3d full para.)

28. Gibson teaches further that memory and analytical capability may be included in the sensor. (Gibson, 2, 2d full para.)

29. The conductive polymer films are said to include homopolymers, copolymers, and blends of such polymers and copolymers. (Gibson 13, first full para.)

30. Gibson also teaches that the polymers may be treated with various ionic dopants. (Gibson 13, first full para.).

31. Moreover, Gibson teaches that "acidic proteins and enzymes may be incorporated into partially charged conductive films during or post polymerization" in order to provide sensitivity to specific molecules. (Gibson 13, 2d full para.)

C. Discussion

Lewis's principal argument is that the Examiner erred in finding that the conductive polymers described by the alternative secondary references would have been considered functional equivalents of the conductive polymers used by Gibson in the sensing elements of the conductimetric sensor. Accordingly, in Lewis's view, the Examiner's rationale that the advantages taught for the particle-filled conductive polymers would have been expected in the Gibson-type sensor is incorrect. On review of the

rejections and the evidentiary record, we find much merit in Lewis's contentions.

The Examiner relied on eight secondary references that describe at least three major types[20] of conductive polymer electrode materials as examples of electrode materials that would have been obvious to substitute as equivalent electrode materials for the electroconductive polymers described by Gibson in conductimetric sensors.

Gibson describes gas sensors having conductive polymers that respond to gases in some way that leads to a change in the electronic characteristics (e.g., resistance, impedance, reactance, or capacitance) of the polymer (Gibson 1, 2d para) which may be doped (*id.* at 3). Gibson teaches further that "copolymers and blends of the above compounds [list of conductive polymers] may be employed" (*id.* at 13, first full para.) and that "[t]he listed polymers may be treated with various ionic dopant molecules incorporated into the conducting films during and post polymerization (*id.*).

As explained in considerable detail by Lewis (Br. 5-6) and not contradicted by the Examiner, the alternative secondary references relate to amperometric sensors. In such sensors, analytes in solution undergo oxidation-reduction ("redox") reactions on the surfaces of the sensing electrodes, which are components of an electrochemical cell. The reactions result in charge flow across the electrode-solution interface, which can be measured and related to the particular analyte undergoing the reaction. In the first set of references relied on by the Examiner, the electroactive

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[20] Five of the conductive polymers contain dispersed metal particles, one contains carbon black, and two contain anions or metal complexes that the Examiner finds are electrical conductors.

polymers coated on the electrodes in the sensors contain metal particles that are said to function as catalysts in the redox reactions of analytes on the surface of the electrodes. None of Casella (polyaniline films containing dispersed copper particles), Li (polyaniline films containing dispersed palladium particles), Thackeray (poly(3-methylthiophene) films containing dispersed platinum particles), or Yamato (polypyrrole/sulfated poly(β-hydroxyether) films containing dispersed palladium particles) teach sensitivity to or detection of analytes in the vapor phase.[21] Sakaguchi describes gas sensors based on redox electrodes comprising a resin, a conductive resin, and an organic metal complex. (*Id.* at 5, first para.; OA 13; Ans. 15.) Naarmann (conductive copolymers doped with derivatives of tetrathiafulvene as conducting salts; Naarmann at 6) and Wampler (polypyrrole doped with carbon black) refer to sensors generically, but provide no details.

Lewis explains, and again, the Examiner does not contest, that conductimetric sensors, such as those described by Gibson, function in chemically and physically distinct ways from amperometric electrochemical sensors. (Br. 4-6.) Thus, Lewis argues, the Examiner has not established any basis for the alleged expectation that the sensitivity to known analyte gases or enhanced sensing or stability taught by the alternative secondary references for amperometric electrochemical sensors would carry over to the conductimetric sensors taught by Gibson. In Lewis's words, "the Examiner is substituting materials that serve different purposes and are selected based

[21] The "gases" O_2 and H_2 detected by Thackeray are dissolved in the aqueous solution: they are not in the vapor phase.

upon different properties (i.e., the materials of amperometric sensors are selected, in part, because the do not change conductivity)." (Br., para. bridging 7-8.)

The weight of the evidence of record, as argued by Lewis, indicates that the mechanisms of action and sensitivity of the two classes of sensors differ. The mere fact, though substantiated by Barisci, that electrodes in both kinds of sensors may be sensitive to perturbations of their composition or of the environment does not, without more, establish a reasonable expectation that an enhancement obtained in one sensor will also be obtained in the other. Absent a similar mechanism of action, why would a particle selected for catalytic activity in an amperometric sensor have been expected to promote sensitivity by changing conductance in a conductimetric sensor? Similarly, the Examiner has not explained why the alleged increase in stability found in three-electrode amperometric sensors would have been expected in two-electrode conductimetric sensors, which function in a different way. Nor has the Examiner shown that the alleged advantages described by Sakaguchi, Naarmann, or Wampler would have been expected when using the corresponding doped conductive polymers in the gas sensors described by Gibson. In summary, the Examiner has not established that the electrode materials would have been recognized or reasonably expected to be functional equivalents in amperometric sensors and in conductimetric sensors.

We therefore REVERSE Rejection A.

In Rejection B, the Examiner relies on Breheret, Mifsud, Moy, and Persaud, individually, as evidence of the obviousness of further limitations

required by certain dependent claims. The Examiner does not rely on these references to augment or to shore up the rejection of the corresponding independent claims. Accordingly, we also REVERSE Rejection B.

New Ground of Rejection

In the following, we highlight certain teachings of Gibson that were mentioned by the Examiner, but not emphasized. We focus on Casella, Thackeray, Naarmann, and Wampler as representative alternative secondary references. Because the thrust of the new rejections is substantially different from the thrust of the Examiner's rejections, we denominate our decision a New Ground of Rejection in order to provide Lewis with a full and fair opportunity to respond.

Claims 98, 104-106, 108, 126-128, 148, and 152 are rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Gibson, Barisci, and Casella.

Claims 98, 104, 105, 108, 126-128, 148, and 152 are rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Gibson, Barisci, and Thackeray.

Claims 104, 105, 108, 126-128, 148, and 152 are rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Gibson, Barisci, and Naarmann.

Claims 98, 104, 105, 108, 126-128, 148, and 152 are rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Gibson, Barisci, and Wampler.

Claims 114, 116, 136, 138, and 158 are rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Gibson, Barisci, Mifsud, and any of Casella, Thackeray, Naarmann, or Wampler.

We determine further that nonobviousness of the independent claims has not been established on the basis of unexpected results.

We leave consideration of the further limitations of the dependent claims, which have not been separately argued thus far, to the Examiner and Lewis. We note further that we have generally restricted our attention to issues raised by the arguments of the Examiner and the Appellants. We have done so because our primary role is that of review. We decline to investigate the record and make findings in the first instance that are best made by those who are, by virtue of their previous involvement and specialization, are better positioned to do so.

We emphasize that although the regulations governing appeals to the Board state that "[t]he new ground of rejection is binding upon the examiner unless an amendment or new evidence not previously of record is made which, in the opinion of the examiner, overcomes the new ground of rejection stated in the decision" 37 C.F.R. § 41.50(b)(1), this new ground of rejection is not likely the last word. As our reviewing court has emphasized numerous times, "[a]fter evidence or argument is submitted by the applicant in response, patentability is determined on the *totality* of the record, by a preponderance of evidence with due consideration to persuasiveness of argument." *In re Oetiker*, 977 F.2d 1443, 1444 (Fed. Cir. 1992) (emphasis added).

The overall basis of the rejection is simply stated. Gibson teaches all the limitations[22] of claim 98 regarding the sensor but for the requirement that the sensing area comprise alternating regions of a conductive organic material and a compositionally different conductive material "selected from the group consisting of an inorganic conductor, carbon black, and a mixed inorganic/organic conductor." In particular, Gibson teaches that "[a] wide range of conductive polymers may be employed" (Gibson at 2, last para.) (including copolymers and blends of copolymers: *id.* at 13, first full para.) in the sensing area of the gas sensors. Moreover, Gibson teaches that "[a] wide range of dopants may be employed" (*id.* at 3, 1st full para.; *id* at 13, 1st full para.), including ionic dopants (*id.*). Gibson also teaches acidic protein and enzymes may be incorporated into the conductive films to provide sensitivity to specific biological molecules. (*Id.*, 2d full para.) Thus, a person having ordinary skill in polymer-related arts, would have recognized that a variety of additional substances could be added to the base conductive polymer to form a sensing element.

On the basis of these teachings, a person having ordinary skill in the art would have had a reasonable expectation of obtaining a sensor by substituting any electrically conductive polymer otherwise meeting the limitations of the gas sensors taught by Gibson. In other words, absent the disclosure of properties incompatible with properties required by Gibson, such as the presence of large conductive particles that would short the leads,

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[22] We take as uncontested on the present record that other limitations as to the sample-handling, detection and analysis appearing in the independent claims would have been obvious over the applied references.

or the inability to form a continuous thin film, etc., Gibson teaches that any conductive polymer would have been expected to work.

In particular, the conductive polymers taught by Casella, Thackeray, Naarmann, and Wampler would have been expected to yield working sensors when substituted for the conductive polymers taught by Gibson. That reasonable expectation of success for such subject matter establishes a prima facie case for claims broad enough to encompass such embodiments, *e.g.*, *Velander v. Garner*, 348 F.3d 1359, 1363 (Fed. Cir. 2003), provided that all other limitations also would have been obvious, as a whole.

The question remains, which claims encompass the obvious subject matter outlined immediately *supra*? The table on the following page summarizes the critical limitations of the independent claims.

TABLE: Major Limitations of the Independent Claims			
Claim	Sensing Area	Different conductive material	Claimed Subject Matter
98	AR	I·O, CB	Sensor
104	AIR	O, I·O	"
105	DR	O, I·O	"
106	AR(pA)	any	"
108	AIR	O, I·O	Sensor Array
126	AIR	O, I·O	"
127	AIR	any	"
128	AIR	O, I·O	Sensor Array System
148	AIR	any	System
152	AIR	O, I·O	"

Key

AR	alternating regions (organic)
AIR	alternating interpenetration regions (organic)
DR	dispersed regions (organic)
pA	polyaniline or emeraldine salt
O	Organic, Organic Complex
I·O	Inorganic, mixed Inorganic/Organic
CB	Carbon Black
app	apparatus

All sensing areas comprise a conductive organic material and a compositionally different conductive material as specified.

Inorganic materials are limited as recited in claim 98, reproduced *supra* at 4.

All claims except claim 127, which uses means-plus-function language, recite an apparatus (claim 152, "detector") for detecting a change in the sensing area upon exposure to an analyte. The nature of the change is not specified, except in claim 128, which requires an apparatus that measures an electrical change.

When interpreting claims in an application for patent, we must interpret the claims using "the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant's specification." *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997).

Applying this principle to the terms "alternating regions," "alternating interpenetrating regions," and "dispersed regions," we observe that Lewis has not, in the filed appeal briefs, directed our attention to express definitions of these term in the 644 Specification. The term "alternating regions" often suggests isolation, such that the regions A and B in a structure

. . . ABABABABAB . . .

do not connect with one another. In contrast, the term "alternating interpenetrating regions" often suggests that the A regions are connected and the B regions are connected, like a pair of opposed combs with interpenetrating teeth or the interdigitated electrodes shown in Figure 1 of the 644 Specification. The term "dispersed regions" ordinarily suggests that regions A are not connected to one another and are scattered in an otherwise continuous medium B.

However, the 644 Specification does not distinguish among these possibilities. In the general summary of the invention, compositionally distinct "regions" are described, and the sensor is said to provide "an electrical path through the regions of the organic material and the conductive material. (Spec. 8, ll. 2-3, etc.) In the detailed description, the regions

having different compositions are described as "alternating" and as providing a conductive path having different conductivities "transverse to the electrical path between the conductive leads." (*Id.* at 25, ll. 11-14.) Strikingly, the preparation of such materials is described to be the result of blending a conductive material into a conductive organic material. (*Id.* at ll. 14-16.) Moreover, according to the 644 Specification, "in a colloid, suspension, or dispersion of particulate conductive material in a region of conductive organic material, the regions separating the particles provide changes in conductance relative to the conductance of the particles themselves." (*Id.* at ll. 18-20.) Examples of solution casting, suspension casting, and mechanical mixing are provided for cases in which there is a common solvent for both materials, a solvent for only one material or the other, or no solvent for either material, respectively. (*Id.* at 38-41.) The 644 Specification does not appear to describe specific techniques for making the "alternating" and "alternating interpenetration" regions as narrowly described in the preceding paragraph. Thus, it is consistent with the written description to apply a broader reading to the three named regions.

Keeping in mind that we are not writing on a bare slate; that neither Lewis nor the Examiner have found differences among the terms; and that no new matter has been found: we conclude, on the present record, that the terms "alternating regions," "alternating interpenetrating regions," and "dispersed regions," as used in the claims, are synonymous. Should any other interpretation be advanced during further prosecution of these claims, basis in the originally filed 644 Specification should be identified.

We note further that carbon black is described as an organic compound (e.g., Spec. 26, l. 14), and is therefore available as the "different conductive material" not only in claim 98, in which it is specifically recited, but in all the other claims, which either recite an organic different conductive material or do not recite any compositional limitations on the different conductive material.

Finally, we note that the 644 Specification defines a conducting region as "anything that can carry electrons from atom to atom, including, but not limited to, a material, a particle, a metal, a polymer, a substrate, an ion, an alloy, an organic material, (e.g., carbon, graphite, etc.) an inorganic material, a biomaterial, a solid, a liquid, a gas or regions thereof." (Spec. 28, l. 16 to 29, l. 5.) Indeed, the 644 Specification indicates the electrically conductive organic region "can optionally be a ligand that is attached to a central core making up [a] nanoparticle" (*id.* at 29, ll. 16-18) in a colloid. Thus, the "different conductive material," in the most general case, can be a very small region in the sensing area of the sensor.

Claims 98, 104-106, 108, 126-128, 148, and 152 are rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Gibson, Barisci, and Casella.

We have no difficulty finding that Casella (conductive polyaniline films containing dispersed copper particles) meets the sensing area requirements of the organic conductor and the compositionally different conductive material recited in all of the independent claims.

Claims 98, 104, 105, 108, 126-128, 148, and 152 are rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Gibson, Barisci, and Thackeray.

Thackeray (poly(3-methylthiophene) films containing dispersed platinum particles) is similar to Casella. However, Thackeray does not describe or suggest conductive polyaniline films containing a compositionally different conductive material. Thus, Thackeray, in combination with Gibson and Barisci, does not suggest the alternating regions required by claim 106. The limitations of the other independent claims do not, however, exclude either the organic conductive polymer or the compositionally different conductive material disclosed by either Thackeray.

Claims 104, 105, 108, 126-128, 148, and 152 are rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Gibson, Barisci, and Naarmann.

Naarmann describes conductive electrode materials having a conductive polymer and a conductive anion (tetrathiafulvene) salt. As Lewis points out (Br. 25), Naarmann does not describe an inorganic conductor, a carbon black conductor, or a "mixed inorganic/organic conductor" as required by claim 98. Nor does Naarmann describe polyaniline films, as required by claim 106. However, independent claims 127 and 148 do not limit the conductive organic compound or the different conductive compound in any way, other than that they be compositionally different from one another. Moreover, remaining independent claims 104, 105, 109,

126, 128, and 152 include organic conductors and organic complexes in addition to inorganic conductors and mixed inorganic/organic conductors as the "compositionally different conductive material." Thus, given the broad scope of the term "organic conductor" (which, in any event, includes "organic complex"), we cannot say the Lewis has shown harmful error in the Examiner's finding that the tetrathiafulvene salts of Naarmann are conductors meeting the compositionally different conductive material required by claims other than claim 98.

Claims 98, 104, 105, 108, 126-128, 148, and 152 are rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Gibson, Barisci, and Wampler.

Wampler (polypyrrole and carbon black) does not describe polyaniline based electrodes. Thus, claim 106 is not obvious over combinations of Wampler, Gibson, and Barisci. None of the remaining independent claims exclude polypyrrole as the organic conductive material or carbon black as the other conductive material.

As already noted, the "apparatus" limitations of the independent claims have not been argued with particularity as bases for patentability. On the present record, we find such features to be obvious aspects of sensors and sensor systems that are suggested by both Gibson and Barisci.

We conclude that a prima facie case of obviousness, based on a reasonable expectation of successfully substituting conductive polymers with the additional "other conductive materials" taught by the alternative

secondary references, has been established, with the exceptions set forth *supra*.

Claims 114, 116, 136, 138, and 158 are rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Gibson, Barisci, Mifsud, and any of Casella, Thackeray, Naarmann, or Wampler.

These claims cover two distinct limitations: temperature control of at least one sensor in the sensor array (claims 114, 116, 136, and 138); and the requirement that at least additional one sensor from an enumerated list be included in the claimed system (claim 158). The Examiner has relied on either Mifsud or Breheret as evidence that it would have been obvious to use a named sensor element in combination with sensors elements of claim 152 in an odor sensor, and to control the temperature of a sensor in Gibson's device, as modified by using a composite polymer described in at least one of the alternative secondary references. The Examiner relies on Moy and on Persaud as evidence of the obviousness of combining metal oxide sensors gas with conductive polymer sensors in an odor sensing array system.

Although we rely only on Mifsud, the arguments relating to the additional references are instructive.

Mifsud teaches that semiconductive (metal oxide: Mifsud, col. 7, ll. 47-49) gas sensors 6, conductive polymer gas sensors 7, and surface acoustic wave gas sensors 8 (Mifsud, col. 5, ll. 44-46) are sensitive to the temperature and humidity (*id.* at col. 6, l. 65 to col. 7, l. 1), and that measurements are required to perform comparisons of different odorous substances (*id.* at col. 7, ll. 1-3). (*See* OA 16.) Moreover, Mifsud teaches

that the three kinds of sensors are combined in a single device, either serially (Fig. 1) or in parallel and in series (Fig. 2). (*Id.* at col. 5, ll. 13-19.)

Lewis argues that Mifsud does not cure the defects alleged regarding the Examiner's combination of the teachings of Gibson and the alternative secondary references. (Br. 35.) But there are no deficiencies as to independent claims 108, 128, and 152 in the new ground of rejection. Lewis argues further that Mifsud teaches away from the claimed invention because Mifsud teaches that conductive polymer films are less sensitive than semiconductor gas sensors. (*Id.*) This is not persuasive of harmful error because the alleged superiority of one type of sensor over the other has little if any bearing on Mifsud's teaching that it would have been obvious to combine sensors to take advantage of sensors having different sensitivities. Lewis also argues, and the Examiner does not contest, that the temperature of the semiconductor response is inverse to the limitation on the inorganic conductor that the electrical conductivity decrease as the temperature increases. (*Id.*) This argument is misplaced, however, because that temperature sensitivity is a limitation only of the inorganic conductor that comprises the compositionally different conductive material in the alternating interpenetrating region recited in claim 152. The additional sensors recited in claim 158 are not limited by such a temperature dependence. Moreover, Mifsud also uses surface acoustic wave detectors in combination with conductive polymer detectors. We conclude that it would have been obvious to combine detectors from the list recited in claim 158 with other kinds of detectors to gain the particular sensitivity advantages of each type of detector in a single sensor. Lewis does not address the

obviousness of applying the temperature control taught by Mifsud. We conclude it would have been obvious, based on Mifsud, to provide temperature control of conductive polymer sensors as required by claims 114, 116, 136, and 138, in sensor arrays or systems including sensors obvious over the combined teachings of Gibson and Barisci.

Moy, as applied against claim 158, is largely cumulative with Mifsud, but without temperature control. Persaud does not appear to describe a sensor in the list recited in claim 158. Breheret is somewhat more complicated. According to Breheret, the temperature of the array of five semiconductor gas sensors was controlled. (Breheret 104, cited at OA 15-16.) Breheret also reports that an array of twenty different conducting polymer gas sensors was tested; but Breheret is silent as to temperature control of the conducting polymer gas sensors. We conclude that at best the Examiner's reliance on Breheret for the obviousness of combing plural types of sensors is cumulative with Mifsud, and that Breheret does not advance the Examiner's contention that temperature control of the claimed conductive sensors would have been obvious.

Accordingly, we hold that, in view of the teachings of Mifsud, it would have been obvious to apply temperature control, as required by claims 114, 116, 136, and 138, to alternating interpenetrating electrode sensors obvious in view of the combined teachings of Gibson, Barisci, and any of Casella, Thackeray, Naarmann, or Wampler.

Similarly, we hold that it would have been obvious to combine alternating interpenetrating electrode sensors obvious in view of the combined teachings of Gibson, Barisci, and any of Casella, Thackeray,

Naarmann, or Wampler, with the surface acoustic wave detectors and electrochemical detectors described by Mifsud.

In its Brief (Br. 38-39) and at oral argument (Tr. 10, l. 10; *id.* at 22, ll. 9-22), Lewis argued further that evidence of unexpected results, in particular, the demonstration that the "response [to triethylamine] is orders of magnitude larger than any seen from sensors prepared from insulating polymer-carbon black composite films" (Br. 39, citing Figure 4 [sic: and 5] and Spec. 15, ll. 12-18 [sic: and Spec. 15, l. 19 to 16, l. 2]) should be given weight.

A heightened sensitivity of three- to four-orders of magnitude is indeed impressive. The difficulty with this demonstration is that evidence of unexpected results must be commensurate in scope with the claimed subject matter. *In re Peterson,* 315 F.3d 1325, 1330–31 (Fed. Cir. 2003) (citing additional cases). In the present case, the 644 Specification indicates that a chemical reaction between certain analytes and certain conductive polymers results in structural changes in the polymer that transform the polymer from a conductive state to an insulating state. In the words of the 644 Specification, regarding a particular example, "[t]his mechanism appears to be responsible for the majority of the resistance increase observed upon exposure of the acid-doped emeraldine sensors to amines." (Spec. 83, l. 19 to 84, l. 1.) The disclosure teachings further that the proposed mechanism for the response of the sensor to more common solvents—i.e., solvents that do not react with the conductive polymer—involves a decrease in conductivity through the carbon black particles. The magnitude of such a

response—0.5% to 5% ΔR/R at 1% vapor pressure (Spec. 77, ll. 12-17; see also Figure 11a, described at Spec. 87, comparing response to common solvents with the response to butylamine)—is not reported as unexpected.

On the present record, it appears that the very high sensitivities are limited to combinations of sensors based on conductive polymers as the continuous phase with analytes that react chemically with those conductive polymers. Sensitivity to nonreactive analytes such as water or methanol, appears to be ordinary. But none of the independent claims are so limited as to both the sensor and the analyte. On the present record, we conclude that the evidence of unexpected results is inadequate to overcome the prima facie case of obviousness.

At oral argument, Counsel indicated that, following a period of vigorous prosecution, an impasse had been reached and that an appeal was judged necessary to move the case forward, temporarily precluding the introduction of additional evidence. (Tr. 23, ll. 10-18.) The delays reaching this point are unfortunate, particularly so given the as yet unresolved issues remaining in this application. Yet, we hope that certain issues of claim interpretation, particularly as to the scope of the claims, and certain issues regarding the teachings of the references, have been clarified sufficiently to allow further progress towards resolution of this application for patent.

We remind the Examiner and Lewis that although all the independent claims have been rejected, as well as claims subject to Rejection B, we have not considered the remaining dependent claims. We leave the disposition of those claims to the Examiner in the first instance.

We have also not entered new grounds of rejection based on references that we consider essentially cumulative on the present record. This omission is not preclusive; but the Examiner should consider carefully whether another reference raises a distinct issue of patentability before entering yet another rejection of an already rejected claim.

D. Order

We REVERSE the Examiner's rejection of claims 98-110, 112, 113, 115, 117-123, 126-135, 137, 139-157, and 159 under 35 U.S.C. § 103(a) in view of the combined teachings of Gibson, Barisci, and any of Casella, Li, Thackeray, Yamato, Wampler, Naarmann, or Sakaguchi.

We REVERSE the Examiner's rejection of claims 114, 116, 136, 138, and 158 stand rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Gibson, Barisci, and any of Casella, Li, Thackeray, Yamato, Wampler, Naarmann, or Sakaguchi, and any of Breheret, Mifsud, Moy, or Persaud.

We enter the following New Grounds of Rejection:

Claims 98, 104-106, 108, 126-128, 148, and 152 are rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Gibson, Barisci, and Casella.

Claims 98, 104, 105, 108, 126-128, 148, and 152 are rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Gibson, Barisci, and Thackeray.

Claims 104, 105, 108, 126-128, 148, and 152 are rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Gibson, Barisci, and Naarmann.

Claims 98, 104, 105, 108, 126-128, 148, and 152 are rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Gibson, Barisci, and Wampler.

Claims 114, 116, 136, 138, and 158 are rejected under 35 U.S.C. § 103(a) in view of the combined teachings of Gibson, Barisci, Mifsud, and any of Casella, Thackeray, Naarmann, or Wampler.

This decision contains new grounds of rejection pursuant to 37 C.F.R. § 41.50(b). This section provides that "[a] new ground of rejection… shall not be considered final for judicial review."

37 C.F.R. § 41.50(b) also provides that the Appellants, WITHIN TWO MONTHS FROM THE DATE OF THE DECISION, must exercise one of the following two options with respect to the new grounds of rejection to avoid termination of the appeal as to the rejected claims:

> (1) Submit an appropriate amendment of the claims so rejected or new evidence relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the proceeding will be remanded to the examiner. . . .
> (2) Request that the proceeding be reheard under § 41.52 by the Board upon the same record . . . .

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

<u>AFFIRMED: 37 C.F.R. § 41.50(b)</u>

PL Initial:
sld

Joseph R. Baker, APC
Gavrilovich, Dodd & Lindsey LLP
4660 La Jolla Village Drive, Suite 750
San Diego, CA 92122

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Joseph R. Baker, APC
Gavrilovich, Dodd & Lindsey LLP
4660 La Jolla Village Drive, Suite 750
San Diego, CA 92122

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

RECORD OF ORAL HEARING

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex Parte NATHAN S. LEWIS, CAROL LEWIS, ROBERT GRUBBS, and
GREGORY ALLEN SOTZING

Appeal 2009-010154
Application 09/409,644
Technology Center 1700

Oral Hearing Held: December 10, 2009

Before EDWARD C. KIMLIN, CHARLES F. WARREN, and
MARK NAGUMO, *Administrative Patent Judges.*

ON BEHALF OF THE APPELLANT:

JOSEPH BAKER, ESQUIRE
Gavrilovich, Dodd & Lindsey, L.L.P.
4660 La Jolla Village Drive, Suite 750
San Diego, CA 92122

The above-entitled matter came on for hearing Thursday, December 10, 2009, commencing at 2:36 p.m., at the U.S. Patent and Trademark Office, 600 Dulany Street, Alexandria, Virginia, before Todd Brown, a Notary Public.

THE USHER: Good afternoon, Calendar No. 45, Mr. Baker.

MR. BAKER: Thank you.

THE USHER: You're welcome.

JUDGE KIMLIN: Good afternoon, Mr. Baker.

MR. BAKER: Hi. How are you?

JUDGE KIMLIN: Our transcriber today is Todd Brown.

MR. BAKER: I'm sorry?

JUDGE KIMLIN: Our transcriber today is Todd Brown. If you have a business card for him, I'd appreciate it.

MR. BAKER: Um-hum. My name is Joseph Baker. I represent the Appellant. I'm with the firm of Gavrilovich, Dodd and Lindsey. My Reg. No. is 40,900.

Unless there's any particular questions to begin, I'll go ahead and start. This case has been around for quite some time. It was filed as a nonprovisional in October of 1999, so it's been pending for ten years. The Notice of Appeal was filed back in 2004, and, as you know, the file history is very long. It's gone up to final and gone back to first after interviews with the Examiner on three occasions. Finally, we reached an impasse and the Examiner Soderquist and I agreed that it was time to take it up on Appeal. So we appreciate the Board hearing the case and spending your time on it.

Really, this case comes down to an obviousness rejection. There's two different criteria here that have been applied. There's the old teaching suggestion motivation back in 2004, and now, we're under the new relaxed standards under KSR. And even under the relaxed standards of KSR, the obviousness rejection doesn't hold weight, for two reasons. Number one, we're taking two different types of technology and pulling them together, one being electrochemical sensors and the other one being conductor metric sensors. They function --

JUDGE NAGUMO: If I could break in here, the main reference, Gibson, is a conductimetric sensor.

MR. BAKER: Correct, correct.

JUDGE NAGUMO: As I understand, Gibson teaches -- it makes a sensor with a couple of leads and a conductive polymer between them, and there can be all kinds of geometries and -- electrodes, and why -- why would it not have been obvious, with a reasonable expectation of success based on Gibson, to take any conductive polymer, any polymer known to be conductive, and apply it as the -- including that since as you can have lines of polymers, why isn't that, with the other references, sufficient to make the claims for prima facie obviousness anyway?

MR. BAKER: Well, Gibson actually does. It uses a polymer layer. And there's been a question between the Examiner and I what blends actually means. And when you read the specification of Gibson, it doesn't really talk about what blends means. It talks about using co-polymers. But when you read through and you review the co-polymers, they're really discussing taking the monomeric units and putting them together.

And so --

JUDGE NAGUMO: Well, it says blends, also co-polymers and blends of the above compounds, may be employed. This is at page 13, in the first full paragraph. And the above compounds that he's talking about are various conductive polymers.

The other thing is, though, your claim says alternating regions, and as I read the specification, at first, I was saying okay, you know, alternating regions, but it includes a conductive matrix of poly anions, I would say, and little disbursed bits of carbon black in it, and that's considered to be an alternating region, I think.

MR. BAKER: Correct.

JUDGE NAGUMO: So, and then the specification also says -- it talks about what is a conductive region and it gets down to a single anion can be a conductive region. And so, given that scope of what alternating regions can be, why don't all of the references make this? I mean there's one that, a couple -- the -- I think it's Naarmann and Sakaguchi, and I looked at them first, and, you know, TCMQ, how's that a separate conductive region, and then I read the spec, and I'm thinking, gee, maybe this wasn't such a weird rejection after all. Why isn't it within the scope?

MR. BAKER: Well --

JUDGE NAGUMO: So if can you explain?

MR. BAKER: Okay. So there's a whole bunch of questions there. We'll start with Gibson. Gibson teaches polymeric materials. In their teaching of polymeric materials, number one, they don't include inorganics, such as gold, silver, carbon black. It's purely polymer materials.

In fact, if you look at Moy, for example, you'll get, first of all -- I think it's Moy and Breheret, I think I'm pronouncing that right, two references that were cited by the Examiner. Those two references actually teach a way for the use of polymer materials in conductimetric systems, so you're not sensitive about --

JUDGE NAGUMO: Yeah, but those, those were applied only against Casella. That was a secondary rejection. And it's really a primary one that I think we really need to get our grips on first.

MR. BAKER: To get your grips on, okay.

JUDGE NAGUMO: So --

MR. BAKER: If we look at -- if we look at, for example, Claim 98, which is the first independent claim under rejection, it actually includes alternating regions of a first conductive material and a compositionally different material. And the compositionally different material is selected from a group of inorganics, for example, gold, silver, carbon black.

That mixture, actually, that combination of the different types of regions that are in this material, the sensor region, actually provided benefits that none of the other ones had. And, specifically, better sensitivity towards volatile means, things that are found in bad food, rotten food, that having been shown before.

JUDGE NAGUMO: Well, but that's a very limited showing if you're going to unexpected results.

And the other thing I want to get into the mix here is that 98, and I think one other independent claim, are limited to that inorganic list, inorganic, carbon black, or mixtures of organic and inorganic. The others

are organic or inorganic and there are a couple of claims that just say compositionally different. So, that argument, at best, applies to 98 and maybe one other dependent claim -- independent claim.

And I really want to get back to this alternating regions business, because that seems to take all of these rejections that the Examiner made, that frankly look a little bit odd, especially if you're going to focus on amperimetric versus conductimetric.

But all along, the Examiner is trying to say I've got equivalent materials. What's equivalent to a conductive polymer? That's the material that Gibson uses. All of these other things are known to be conductive polymers. Go ahead and use them. Prima facie obvious.

MR. BAKER: Well, if we -- if we -- well, let's just, again, start with the primary reference, Gibson. It doesn't teach the combination of the composite materials of the inorganics and the polymeric materials. And the Examiner has recognized that, and that's why he brings in the secondary references, is to actually teach that, okay, there were materials that were combinations of organic polymers and inorganics. However, in those systems, those are all electrochemical systems.

JUDGE NAGUMO: But that's -- the rejection is, I take these conductive organic polymers, they've got other stuff in them, I take that material and I use that as the electrode material or the sensing material in Gibson, and, says the Examiner, I'd have a reasonable expectation of success, and I seem to meet your claims, or an awful lot of them.

MR. BAKER: And that's -- and I agree, that's what the Examiner has done.

JUDGE NAGUMO: Right.

MR. BAKER: And the point being is that when you take and you look at the different types of sensors and how they're used, electrochemical sensors are not meant to actually bind an analyte.

JUDGE NAGUMO: But that's not the Examiner's point, as I understand it. Well, I mean, he made a lot of arguments about that, but he also says, look, any conductive organic material -- any conductive organic polymer would be expected to work as the conductive organic polymer in Gibson. There are a bunch of them. Gibson doesn't have the inorganic particles. I've got a bunch of references, too many, but I mean that's the way it is. Metal particles. I've got carbon black in polymers. I've got doped polymers. And then, why don't these actually meet the limitations of the claim?

MR. BAKER: The reason that those particular materials were selected in the electrochemical systems was because they're not meant to bind to any analyte and change resistance. They're actually selected in those systems because what they do is they conduct -- they take and they -- they're in an electrolyte solution, and the electrons are meant to flow through them. If they bind in those systems, they become poisoned and they cease to function properly. So one would not go and say let's use the materials and electrochemical sensors, and put them into resisto-metric, because the electrochemical sensors are selected for the purpose that they don't bind to analytes.

So the Examiner has taken and said here's a material, but it functions for a totally different reason and it's selected for a different reason than what you would do -- select it for a conductive metric system.

JUDGE NAGUMO: But it -- don't the -- aren't the other polymers in -- what's the name -- Casella, for example, that's an electro-conductive polymer, isn't it? I mean it conducts electrons. That's what Gibson says. Use an electronic-conducting polymer in my sensor.

MR. BAKER: A polymer --

JUDGE NAGUMO: But he -- Gibson may not have rushed out and taken a conductive polymer with copper logs in it. But somebody of ordinary skill in the arts, says the Examiner, reading Gibson and Casella, would say well this conductive polymer would work in Gibson. I'd expect it to work quite well because it's conducting.

MR. BAKER: But the purpose that it's in the electrical sampling systems, and, for example, Casella, one of the references that's cited as a secondary reference, says that this material is selected because it is inert. And I use the term invisible because it's meant to be invisible. It's not meant to react with the analytes in a system.

Whereas in the system that Dr. Lewis uses, that the Appellant uses, it's meant to bind an analyte. It's meant to change the resistance. And the reason that we have the difference, conductive materials, and compositionally different conductive materials, because as the analytes bind, they swell and they change. And you can measure that change across the conductive leads.

JUDGE NAGUMO: But would there not be a reasonable expectation of successfully using any conductive polymer -- I mean that's sort of the proposition, the one that works for the Examiner.

MR. BAKER: And, you know, and --

JUDGE NAGUMO: That it would work for Gibson --

MR. BAKER: A good example that would actually kind of demonstrate that's not effective was if you look at glucose oxidase sensors, which are electrochemical systems, where you put an enzyme on it, and it's meant to actually be nonconductive. It's mean to actually convert the presence of analyte to anion, so that it measures through the electrochemical system, if you took that same material and you put it into a resistant metric system, it wouldn't function. So, you can't just say that because it's an electrochemical system, it would be expected to work in a resistant metric system. It's --

JUDGE NAGUMO: But that isn't quite the rejection, as I understand it.

MR. BAKER: Well, there's one other --

JUDGE NAGUMO: Gibson teaches conductive polymers, these conductive polymers. There's a whole bunch of them.

MR. BAKER: Yeah, he teaches --

JUDGE NAGUMO: So, you'd sort of expect --

MR. BAKER: He teaches conductive polymers --

JUDGE NAGUMO: Would you not sort of expect any conductive polymer to be functional, maybe not very well, but it would function as some sort of a chemical sensor for vapors as taught by Gibson?

MR. BAKER: And, and that is -- that is a good point that you made. That it may not function that well.

And, in this particular case, the system that Dr. Lewis developed is very sensitive to volatile amines. Something that would be unexpected.

JUDGE NAGUMO: Well, with the particulars embodiment --

MR. BAKER: I'm sorry?

JUDGE NAGUMO: -- I'd agree. The particular embodiment works very well, a polyaniline, you know, doped with --

MR. BAKER: A polyaniline, polypyrrole -- they're sensitive to particular types of materials.

JUDGE NAGUMO: But that's not the scope of Claim 98. There's only one claim that has polyaniline, emeraldine, as the conductors.

MR. BAKER: Those particular --

JUDGE NAGUMO: Polymers.

MR. BAKER: And they're still -- those are still under rejection for the same purposes as the independent claim is. Whereas it would be an obvious variation, and the Examiner, you know, in doing his job, has -- we've come to the impasse where we've brought it before you, and there's really, truly, an unexpected result involved here.

JUDGE NAGUMO: All right. Is the unexpected result commensurate in scope with Claim 98?

MR. BAKER: In Claim 98 -- so, he -- so, Dr. Lewis has shown that there are polymers in combinations of inorganic materials, and, in fact, we've amended the claims to eliminate semiconductive materials by the language that's in the claim.

And so we're -- we're actually talking about inorganic conductive materials and conductive polymers. And those materials, in addition, since the filing of the Application, he has developed more, and because it has been up on appeal for so long, to submit additional Affidavit Declarations, which is inappropriate, because then we'd have to take it out of appeal.

We actually have additional data that shows that these are effective. So we're trying to get the scope that's really deserved by what the Applicant's done. And, in this case, the Examiner has taken the plain polymers and systems that are not really meant to bind analytes and combined them.

In fact, even in KSR, they've said that if you actually take two different things that were preexisting in the art, and you put them together, and they function in a different way, that actually is a nonobvious invention. It's something that actually moves technology forward and it should be rewarded by a patent.

And that's what Dr. Lewis has done, is he's taken these materials, and for the purposes of what they were originally done, where they were meant to be invisible, and electrons were meant to flow and not bind analytes, he's demonstrated that if you do take these and you put them in this wholly different system that functions in a different way, you get these unexpected results. You have a technology that can be used for tele-medicine. You have -- it can be used for food processing. It can be used for things that other sensors could not detect, these volatile remains, or other byproducts of biological systems.

JUDGE NAGUMO: The evidence of record is based on a couple of conductive polymers with carbon black, and the unexpected sensitivity appears to be with a means, and there's a statement, I think in the spec, that sulfides and the like, would be -- or SH-containing materials might also be expected to be especially sensitive here. But the response to things like water and other common vapors appears to be about the same. So, how is the evidence of unexpected results that's of record, because that's all we've got --

MR. BAKER: Right.

JUDGE NAGUMO: -- commensurate in scope with Claim 98, for example, -- or, let's see, what does it say -- Claim 127, which just requires a different conductive material.

MR. BAKER: It's -- I think when you look at --

JUDGE NAGUMO: I mean they're huge -- these claims, most of them are extremely broad as to all the materials involved.

MR. BAKER: And the --

JUDGE NAGUMO: And how is that -- is the art so predictable that --

MR. BAKER: That you base --

JUDGE NAGUMO: -- based on the disclosure of the specification --

MR. BAKER: -- it on the material --

JUDGE NAGUMO: -- that we can extrapolate to the scope of the claims, based on the few examples in the spec?

MR. BAKER: So, if we look at the specification, there is -- and I believe it's Figure 7 and Figure 11-A -- demonstrate where there is this

increased response to a means, where he has tested additional -- a means against certain sensors, and then there's -- and I apologize -- there's another particular analyte that's -- couldn't be detected quite as well in previous systems that has a just magnitude better response in this system.

As I mentioned, Dr. Lewis has actually developed additional combinations of polymers, using inorganics, where he has demonstrated that they have the same properties. Those were not of record at the time, but they can be made of record by declaration --

JUDGE NAGUMO: Well, they -- I mean I'm perfectly willing to grant that this is a fabulous, fascinating area. But I've got a set of claims, and I've got a disclosure, all of which seem to be very limited, compared to the scope of the claims. And I'm not sure that we have conceded prima facie obviousness, but since we're talking about unexpected results here, they've got to be at least commensurate -- reasonably commensurate in scope with the claims.

So you'd expect that they're reasonably -- for all possible -- well, large regions of the claim would reasonably be expected to have these results. And it seems like you at least need chemical reactions between your conductive polymer and the analyte, or you're going to be especially sensitive to it, otherwise, your results seem to be pretty much like what they had before with nonconductive polymers and the, say the carbon black dispersions. Really not very different for a detection of water vapor, carbon tetrachloride, whatever.

MR. BAKER: Right. And, I think --

JUDGE NAGUMO: So, again, we're not commensurate in scope, are we?

MR. BAKER: For -- a couple of things, if we're talking about the enablement with regard to the scope of the claims --

JUDGE NAGUMO: No. We're talking about -- I'm not talking about enablement.

MR. BAKER: Okay.

JUDGE NAGUMO: I do want to make that clear. It's just are we commensurate in scope? If we're talking about unexpected results --

MR. BAKER: Right.

JUDGE NAGUMO: -- are we reasonably commensurate in scope and what's the evidence of that?

MR. BAKER: Based upon the evidence in the publications that Dr. Lewis has now -- the record --

JUDGE NAGUMO: Of record, of record.

MR. BAKER: Right, and so --

JUDGE NAGUMO: Right. We can't look at those.

MR. BAKER: As, as you'll recognize, as technology has developed, and particularly in this particular case, you file based upon what the inventor has developed and what would be reasonable under the circumstances based upon what the inventor considers would be useful.

And, at the time, in order to avoid people preempting your filings with publications, or coming in and filing before you, you file with what you have at the time, even though continued experiments are developing to

demonstrate that there's additional polymers and additional combinations that have that sensitivity.

And here, what I believe is happening is we're focusing on the specific examples, even in view of a broader discloser, where we've demonstrated that yes, there's additional polymers, there's the combinations of inorganics, and there's a large number of polymers that are available. And we've provided a description of a lot of those polymers in the specification.

And, as you're going through, as research develops, you go through and you test those, and you can actually demonstrate that a large number of them have those properties. But, at the time of filing, you file with what you have at the moment. And the scope of what we're talking about is still -- and they've still described, and it still has those purposes. And if I have the opportunity, back when this was actually being brought up on appeal, after numerous discussions with the Examiner, if that was the Examiner's concern, we could have done additional experiments at that time and provided a declaration.

And we actually did talk to the Examiner, three separate times by teleconference, and the Examiner withdrew the finality. And we went through prosecution again and withdrew the finality, and prosecution again, and we thought we were moving things forward and explaining the technology.

And it's before you, it's because we came to this impasse, where the Examiner has, you know, in doing his job, basically rejected the claims upon his beliefs, and there's data in there that shows these unexpected results that

leads to certain polymers, and we could provide that with additional polymers.

But that point came as -- our concern was, the prosecution was being drawn out, the same references were being applied, and even in arguing that Gibson doesn't teach the combination of the composites, and that when you actually do look at combinations of composites, they're in a system that's not meant to function that way; it's not meant to. Somebody of skill in the art went and looked to materials that are meant to be invisible to analytes, to be them in something that's not meant to be invisible to analytes.

And that's really the crux of what's happened in the prosecution, is there's a combination of the Gibson with nonanalogous art, art that the Examiner went to that somebody of skill in the art wouldn't look to because of the invisibility of those materials to analytes, and combining those two doesn't work.

In fact, Casella discusses the fact that if you actually take and you use these composite materials on electrochemical sensors, they're actually very stable and inert to the analytes, which is what they're meant to be.

And, in Dr. Lewis' invention, they're not meant to be inert to the analytes. They're actually meant to bind. And it's that change, that swelling, that change in the composition, where the composition of the material changes to the analyte that makes it so that you can sense the presence of the analyte.

And that's the crux. That's what's advanced in the technology. And if you take, and you take these sensors, these particular sensors that are sensitive to volatile means and other biological volatile analytes, and you put

them in a system where you're combining it with inorganic materials and nonconductive materials, nonconductive polymers, you get an electronic nose that's able to sense a plurality of different analytes, provide a fingerprint that you can then use to say this is what's in the system; this is what's present. In fact, the technology is licensed to a startup. Some of it's licensed to large companies that use it in airports. And this is important technology to protect. And that's why we're here, is because it is the combination of Gibson with these other secondary references that don't really fit together. They weren't meant to fit together.

And, you know, there's, there's -- KSR points to it, where you can take materials that are present, but if you put them together in a way that they weren't meant to function, or they function totally differently, even under KSR that's not obvious.

If you look at Wang, for example, which is a Federal Circuit case that dates way back that was in the MPEP, they took different materials, where one was a memory chip that was small, and the other one was a memory chip that was large. They were semi-chips. And the Federal Circuit found that they were nonanalogous, even though they were memory chips, because they were meant for different purposes, one for large machines and one for small personal computers. And even under those very, very, I would consider, similar technologies, memory chips, their purpose, their function, was totally different, and the court found that was not obvious.

So, even under the relaxed end of KSR, even in the previous standards of the teaching suggestion motivation, this art is being combined so that it's being changed in a way that it was not meant to function. And Dr. Lewis

actually discovered that if you actually take these materials, they do bind analytes. They do sense things. They have these unexpected results. They're able to sense volatile amino acids, at volatile means.

And he's tested other polymers and we just have not had the opportunity to provide the additional declarations, the affidavits, the evidence, because the case has been up on appeal for so long. And we felt it was important to attempt to resolve the combination of these references that was being pulled together, to resolve this, and get it back where we can actually do more prosecution, and actually, amend the claims if we need to.

And we've been very flexible and we've tried to move the case forward with the Examiner. You know, this is a case that's important to the parties of interest. It's important to the inventor. It's important to the startups. It's important to the licensees. Because it's technology that's being used. It's technology that's important and it's made advances in the sensor systems. It's made advances in tele-medicine. It's something that wasn't there before. And that's really what the patent system is there to protect, is those advances that are important, that are unexpected, and that's why it's there.

KSR probably states it very effectively, when they say that if you move things forward, they function differently, and it provides a use, that that's what the patent system is there to protect.

Gibson, as a primary reference, doesn't have the composites. It uses polymers. Breheret and Moy teach away from using polymer materials because they say they're not sensitive enough.

The electrochemical arts, they're all the secondary references, talked about those particular composites being inert and nonreactive. They don't -- they are not meant to bind analytes, and suddenly, you're taking those under the obviousness rejection that are not meant to bind analytes, and you're putting it into a system that is meant to bind analytes, and that's supposed to be an obvious thing that somebody would do.

But in the field that Dr. Lewis is in, electrochemical sensors are not something that he looks at. He's a resistive chemistry kind of person. He looks at the resistance. He's got -- he's had -- he has a number of patents that have issued that relate to various composites, and there are sensitivities to alcohols and different analytes. And that's really why this case is important. It's a different sensor that's able to detect things better than what was there before and it's important to protect those things.

JUDGE NAGUMO: And if we look at, say, pages 24 and 25 of the Brief -- I think it's those pages -- page 25 talks about resistor composites of plurality of alternating regions of different compositions and therefore different conductivity transfers to the electrical path between the leads, and it talks about you can have this color, or this suspension of the other conductive material, and it says the gaps of different conductors arising from the organic conductive material ranged at length from about 10 to 1,000 angstroms, usually on the order of 100 angstroms.

I'm trying to get at the scope of alternating regions of conductive and nonconductive materials again. And then, there's other disclosure that talks about -- let's see -- I think that's 28 to 29. It says, "The conducting region can be anything that can carry electrons from atom to atom, including, but

not limited to, a material, a particle, a metal, a polymer, and a substrate and ion, an alloy and organic material," and it says et cetera.

MR. BAKER: Right.

JUDGE NAGUMO: With those definitions, that's tells why the Naarmann and Sakaguchi references seem to have, you know, much greater resonance for me, and in light of that disclosure, might not ordinarily think of an anion being a different conductive region, but that's how the specification defines it. So that informs how broad the claim is. It seems to be on, say, polyaniline, doped with some, though modest amount, of a doping agent, a doping anion that is conducted -- or whatever.

With that kind of scope, why does not the combination of something like Naarmann or Sakaguchi, those conductive polymer materials, used as polymer material in a sensor taught by Gibson, it seems to meet all of the limitations, and it seems like you'd expect it to be a sensor. So it seems like it would be prima facie obvious.

MR. BAKER: So --

JUDGE NAGUMO: That's really the problem that I'm trying to wrestle with on the record that I've got in front of me on how I decide this case.

MR. BAKER: Right. So let's back up to the alternating regions. Now, we use that language in there because as you generate these, you can -- the idea is that you have -- and I'm going to use language that's kind of relaxed to try and explain it -- but spots of the organic conductive polymer, spots of the inorganic, and then spots of the other one. So that they're alternating, not necessarily where they're purely alternating, like, for

example, in Figure 1 that I provided in the original Brief, which was really not meant to be limiting in that way. It was just kind of a diagram of how the system works. But it can be alternating, meaning that they jump, I guess could be another way to describe it. So that as electrons flow through this system, from one conductive lead to the other conductive lead, they travel. And if an analyte binds -- if an analyte binds and causes this -- causes areas to swell, regions to swell, which changes the conductivity across the system, and it's those regions, those alternating regions, and how much alternating there is, that changes the resistance, how they swell.

If they were just, for example, a polymeric material, just one, solid polymeric material and one solid inorganic conductor, you wouldn't get the same amount of change in the system as you would if you have smaller regions of the particular angstrom size that's discussed in the application, where you can get that change in resistance that's more effective.

So when we're talking about alternating regions, they can be stacked, they could be, so long as they alternate sufficiently enough and that gap is sufficient enough so you can change the resistance. Or they can be spotted. Spot is probably not quite the right word and if I could diagram it, it might be better. But it causes the electrons to jump. And if an analyte binds and swells, it causes it to jump further, which changes the resistance, is maybe a good way to describe it.

When we're looking at Sakaguchi, and when we're looking at some of the other references, they discuss composites, but they don't use them in sensor systems. One of them uses it, I believe, in an energy source --

JUDGE NAGUMO: If they did, we would have an anticipation, oh there's something very, very close to it. But we've got rejections that seem to say, look, take these conductive polymers, put them into the sensor taught by Gibson, use these other conductive polymers, blended with whatever, and I can keep getting a sense of --

JUDGE KIMLIN: Maybe we could wrap this up. We're considerably over the time frame.

JUDGE NAGUMO: We seem to be. If you -- I can quit.

MR. BAKER: And I guess, in wrapping it up, it is to the Inventor, it's to Dr. Lewis, and to the Appellants that -- it's the combination. Gibson teaches a polymeric material. The other references that have been cited by the Examiner, even though they were cited in dependent claims, if you look at the references and the teachings as a whole that are being applied to the case, those are the references that actually teach away from using polymeric materials. So they would teach away from using Gibson as a primary reference.

The electrochemical systems function for a totally different purpose. They're meant to be invisible and they're not meant to bind analytes. And so, somebody of skill in the art that wants to develop a sense of that binds and alloys and changes resistance, wouldn't look to an electrochemical system that is not meant to bind.

And that is the fundamental difference, is we're taking materials and putting them in the system so that they function different, provide unexpected results and benefits. And KSR recognizes that, the previous standard that was applied by the USPTO and by the Federal Circuit would

take that into account as being these function differently. They function -- they wouldn't be combined. Somebody of skill in the art wouldn't pick something that's meant to be inert and put it into something that's not meant to be inert.

And that even if, even if that happened, we still have the unexpected results, whether you have the increased sensitivity to these volatile means. That wasn't shown by any other references. That wasn't known in the art at the time. And those unexpected properties actually do provide a benefit to society and should be protected. And that's really where the Appellants are.

And you had mentioned about the scope of the claims, the scope of the polymers. Dr. Lewis has done further experiments. He's tested additional polymers and he's shown that they do have these sensitivities. And the opportunity to present those things had passed by the time it went up on appeal and we couldn't provide the declaration, the affidavits, the additional evidence, but we'd be happy to do that. It's just we needed to move the case forward. The Examiner and I were at an impasse, and we were cooperating, and he's been very, very helpful in moving the case up to the Board and with some of the formalities that have happened.

In the end, you know, we appreciate your time. We know it's a thick case. We know it was a lot of reading. There's a lot involved in it, a lot of references, and, you know, we hope that we'll have the opportunity to clarify anything else with the Examiner that might need to be clarified and we hope that, you know, the Appeal will be of benefit to the Appellants and that we can actually move the technology forward.

JUDGE KIMLIN: We'll consider it, study and review it, and we thank you for coming.

MR. BAKER: Thank you.

Whereupon, the proceedings, at 3:14 p.m., were concluded.